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CENTRAL INTELLIGENCE AGENCY

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COUNTRY Poland

SUBJECT 1. Konrad Copper Mines
2. Copper Smelting and Refining Plants

REPORT

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SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

A report containing information on the following

a. Konrad Copper Mines in Ivine (N 51-12, E 15-42) with a description of the flotation installation, mine shafts, ore production figures, and other pertinent data.

b. Legnica Copper Smelting Plant in Legnica (Liegnitz - N 51-12, E 16-12).

c. Cranica (sic)[1] Electrolytic Copper Refinery.

7 MAR 1958

ENCLOSURE ATTACHED
PLEASE ROUTE

1. Comment: Possibly Krynica.

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Copper Installations.

The Polish copper industry is relatively new, since there were no copper mines within the pre-war borders of Poland. The copper mining which has been developed within the last few years has been concentrated in Silesia, which was annexed from Germany. The Silesian copper installations are discussed in three groups below:

a. Konrad Copper Mines and Flotation Installation.

The Konrad and Upadowa Copper Mines are located 90 kilometers to the west of Wroclaw. The ore formation is sedimentary and the same as that of Mansfeld. The ore bed lies in a stratum 1.5-1.8 meters thick and slanted 6-12 degrees. The ores are obtained by underground mining. Ore tenor[1] is 0.8-1.0 percent, and the economical limit is 0.36. The principal copper mineral is chalcopyrite. There are also bornite and kalkosin[2]. The hydraulic sand ramble[3] method is used. Underground transportation is provided by trains of 50 cars, one ton each, drawn

by trolley locomotives. In Konrad in the shafts and in Upadowa-Grodnice ore extraction is done by descenders (sic). There are three shafts in the Konrad mine, which are discussed below:

Konrad I shaft: This shaft, which is still in the process of construction, will be 550 meters deep. It will be equipped with two extraction installations of 1700 KW for 240 meters of depth, and a skip (sic) of six tons for 550 meters of depth. When this shaft is completed, it will be used for ore extraction, and the Konrad II shaft, which is used for this purpose now, will then be used for supplies. The extraction capacity of Konrad I shaft will be 4,000 tons per day.

Konrad II shaft: This shaft, which is 180 meters deep, is equipped with an extraction installation of 380 KW.

Konrad III shaft: The Konrad III has been equipped with an extraction installation of 80 KW and is used as an airing shaft and also in transporting mineral posts. In the Upadowa and Grodziec mines, extraction is made by two descenders making 12-degree angles.

The Konrad I and II and the Upadowa Grodziec are actually operated as three independent mines, and the ores extracted from Konrad II and Upadowa-Grodziec are carried to the flotation installation in Konrad I. After the completing of traverba, both mines will be connected to the Konrad I mine.

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Daily ore production after the amenagement of the mineral is:

Konrad I	4,000 tons
Upadowa-Grodziec	3,000 tons
Total	7,000 tons

Flotation Installation. Owing to the dispersal of the ore in tiny particles and to the slime formation, flotation becomes very difficult and production is low. Although the capacity of the flotation plant is 7,000 tons per day, the plant works below capacity at the present time because a satisfactory amount of ore cannot yet be produced.

Ore is extracted from the mine in units of 300 mm apiece. These are given to the ore silo in eight cups (sic). The ore at first is broken down to 35 mm by Bydgoskic Zaktady Maszin, Polish brand konkasör 6 with hammers which are powered by six Jeffrey-type motors of 2 x 60 KW the hourly capacity of which is 100 and200 tons. It is then broken into 12 mm in three USSR-made Symons conic breakers (300 cm ø). The ore which has been broken down is carried to five refined ore silos the capacity of which is 800 tons.

The process of grinding is performed by USSR-made mills with balls which are moved by five motors of 600 KW, 3200 x 3100 in size, the hourly capacity of which is 60 tons. In these mills, which have 43 tons 120 mm steel ball charge and 20 cycles per minute, the ore is ground into 0.06 mm. The ball consumption per ore ton is 0.14 kilograms.

The ground ore i rocess of flotation is

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done by Humboldt-type flotation machines, the cell capacity of which is 1,000 LT. First, at rough flotation (2 x 6 cellules) a rough concentration of 3-4 percent was obtained, and this was given to clean concentration cellules.

The remnants of the flotation are ground into 80-200 percent mesh in three Cylpebs mills with mill balls and rods of two compartments, 1500 x 5600 mm in size. Then being treated at the real flotation (6 x 16 cellules), a middle concentration consisting of six percent is obtained. The rough and the middle concentrations are treated in cleaning flotation machines (2xlo) and the final concentration containing 12, 15 percent is obtained. The concentrated matter is first filtered through by four USSR-made filters with drums and the dampness is reduced to 20, 25 percent; later the dampness is reduced to 8-10 percent in turning dryers heated by gas, and this material is sent to the melting place.

Reactors used at the Flotation are as follows:

Sodium ethyxanthate	400 gr/ton ore
Pine oil	180 gr/ton ore
Phosocresol B	100 gr/ton ore
Lime	500 gr/ton concentrated (as the flocculating agent to the concentration thickener)

The copper mixture included in the remainder is 0.12 to 0.16, and the copper yield is 75 percent.

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b. Legnica Copper Smelting Plant.

The Legnica Copper Smelting Plant, which is in the process of being built, will be used for working concentrating copper. The technical procedure is the classical [redacted] melting method. The briquettes of 110 mm/and 70 mm which are produced by mixing coke dust into the concentrated copper will contain the same amount of sulphur. The briquettes thus produced will be melted in two WJ furnaces, andthe material containing 38 percent Cu, 24 percent S, and 38 percent Fe will be obtained. In WJ charge, coke of 16 percent will be used, and to obtain one ton of material, approximately three tons of concentrated copper will be melted. The WJ dross, which will contain 0.4 percent copper,will be granulated and cast out (sic). The WJ furnace gases, which will contain roughly 14 percent, will be evaluated by being used in heating the boilers at the energy power station (sic). By blowing the material in four Bierce-Smith type horizontal convertors, one ton of blister copper will be obtained through 2.7 tons of material. The convertor dross containing approximately 2 percent Cu will be sent back to the WJ furnaces. The convertor gases which are estimated to contain 5 percent SO_2 will be used in H_2SO_4 production. The blister copper will be decanted in anode furnaces and moulded into anodes containing 99.5 percent Cu.

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The concentrated copper now being produced is melted in the Trzebinia smelting plant located between Katowice and Krakow. After the completion of the Legnica works, the Trzebinia smelting plant will be converted for use in refining other minerals.

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c. Cranica Electrolytic Copper Refinery.

The Cranica Electrolytic Copper Refinery has a yearly capacity of 12,500 tons and will be enlarged to twice its size. Electrolytic copper of 99.95 percent purity is produced here and moulded into wire-bars by decanting the anodes which are produced at the melting place. Electrolysis tanks made of concrete and lined with leaden plates are 7x3x4 meters in size. In each tank 30 cathodes and 29 anodes are present. The cathodes last for six days and the anodes, eighteen. The density of the current is 220 amp/m^2 and the voltage is 0.3-0.35. For each ton of copper, the energy consumption is normally 430 KWS. The consumption for the month of April 1957 was 360 KWS. The temperature of the electrolyte is 55 degrees; it is composed of the following materials:

H_2SO_4	150-160	gr/lt
Cu	45	gr/lt
Ni	15	gr/lt (less than)
Sb	0.3	gr/lt (less than)
colloid	8	gr/ton copper.

The general melting copper yield including the electrolytic refinement is 94 percent.

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